



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/607,079  | 06/25/2003  | Leo Zhaoqing Liu     | Rhodia.02036 us     | 6545             |
| 110 7590 07/20/2009<br>DANN, DORIMAN, HERRELL & SKILLMAN<br>1601 MARKET STREET<br>SUITE 2400<br>PHILADELPHIA, PA 19103-2307 |             |                      |                     |                  |
| EXAMINER<br>WHITE, EVERETT NMN  |             |                      |                     |                  |
| ART UNIT  |             | PAPER NUMBER         |                     |                  |
| 1623  |             |                      |                     |                  |
| MAIL DATE   |             | DELIVERY MODE        |                     |                  |
| 07/20/2009  |             | PAPER                |                     |                  |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

Application No.

10/607,079

Applicant(s)

LIU ET AL.

Examiner

EVERETT WHITE

Art Unit

1623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 03 June 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 21-28, 39 and 40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 21-28, 39 and 40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Applicant Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-646)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 3, 2009 has been entered.

2. The amendment filed June 3, 2009 has been received, entered and carefully considered. The amendment affects the instant application accordingly:

- (A) Claims 1-20 and 29-38 have been canceled or previously canceled;
- (B) New Claims 39 and 40 have been added;
- (C) Comments regarding Office Action have been provided drawn to:

- (I) 112, 2<sup>nd</sup> paragraph rejections, which has been withdrawn in view of Applicants argument;
- (II) 103(a) rejection, which is maintained for the reasons of record.

3. Claims 21-28, 39 and 40 are pending in the case.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

Art Unit: 1623

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. Claims 21-28, 39 and 40 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Restaino et al (US Patent No. 3,461,052) in view of Jost et al (US Patent No. 5,223,171) or Billmers (US Patent No. 4,973,680) for the reasons disclosed below.

Applicants claim a method for grafting an unsaturated monomer onto a polysaccharide comprising the steps of: (1) forming a mixture comprised of an unsaturated monomer and a water soluble or water dispersible polysaccharide; (2) drying the mixture; and (3) irradiating the mixture with an amount of electron beam radiation sufficient to form an unsaturated monomer-water soluble or water dispersible polysaccharide graft copolymer, wherein the graft copolymer is depolymerized to a molecular weight lower than the molecular weight of the ungrafted polysaccharide, and the polysaccharide in the copolymer has a molecular weight of no more than 700,000 Datons. Additional limitations in the claims include specific unsaturated monomers, specific polysaccharides and specific drying steps.

The Restaino et al patent discloses a process for the production of graft substrates by ionizing radiation, wherein a hydrophilic polymeric substrate is irradiated in the presence of a solution of a monomeric vinyl compound (see abstract). See column 2, 1st paragraph wherein suitable substrates materials are listed, which include cellulose, wool, starch, alginic acid and the alginates, vegetable gums such, for

Art Unit: 1623

example, as locust bean gum, guar flour, or gum tragacanth, gelatin, casein, pectin, polyvinyl alcohol, hydrophile high molecular weight polyalkylene glycols, and the like, which meet the requirement of the polysaccharides disclosed in instant Claims 22-25. Suitable vinyl monomers are listed in the 2nd paragraph of column 2, which include vinyl acetate, acrylic acid and its esters, methacrylic acid and its esters, acrylamide, acrylonitrile, styrene, vinyl toluene, vinyl pyridine, alkyl vinyl pyridines, divinyl benzene, butadiene, N,N-methylene bis-acrylamide, and the like, which meet the requirements of the unsaturated monomers disclosed in instant Claims 22 and 26-28. The Restaino et al patent also teaches using radiation to produce graft copolymers wherein the radiation may also be used to depolymerize the polymers. See column 3, 2nd paragraph wherein Restaino et al patent teaches that useful graft copolymers of cellulose degradation products may be obtained by employing higher radiation doses.

The method for grafting an unsaturated monomer onto a polysaccharide of the instant claims differs from the process of producing graft copolymers in the Restaino et al patent by claiming a drying step after forming the mixture, which proceeds to irradiation of a dry mixture.

However, the Billmers patent suggests that irradiation of a dry mixture for grafting is known in the art by disclosing methods for preparing graft polymers which include polymerization in water, in water-solvent mixtures, and in the dry state, which may be initiated by irradiative techniques (see column 9, lines 59-62). The Billmers patent teaches preparation of polysaccharide graft polymers having structure (II) " Sacch--O(-G)<sub>m</sub>(M)<sub>n</sub> " (see column 2, line 57), wherein Sacch is a polysaccharide and G is the residue of a polymerizable unsaturated monomer, which embraces the polysaccharide and unsaturated monomer recited in the instant claims.

The method for grafting an unsaturated monomer onto a polysaccharide of the instant claims also differs from the process of producing graft copolymers in the Restaino et al patent by claiming that the polysaccharide in the copolymer has a molecular weight of no more than 700,000 Daltons.

However, the Jost et al, which discloses detergent composition containing biodegradable graft polysaccharide shows that graft polysaccharide which consists

essentially of a polydextrose having an average-weight molecular mass of less than 10,000 is well known in the art (see abstract). The average-weight molecular mass of less than 10,000 disclosed in the Jost et al patent falls with the requirement of the instant claims that the polysaccharide in the copolymer has a molecular weight of no more than 700,000 Daltons. See column 2, lines 22-25, wherein the Jost et al patent discloses graft polydextrose being obtained by any known process for grafting ethylenically unsaturated monomers onto polysaccharides and the next sentence which states that the grafting may be effected by irradiation, which is within the scope of the process requirements of instant Claims 21-28, 39 and 40.

One having ordinary skill in the art would have been motivated to combine the teaching of the Restaino et al patent with the teachings of the Billmers and Jost et al patent since each of the patents disclose preparation of polysaccharide by grafting a unsaturated monomer onto a polysaccharide.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the grafting conditions use to produce graft copolymers via radiation of the Restaino et al patent with grafting under dry conditions in view of the recognition in the art, as evidence by the Billmers patent, that the preparation of graft polysaccharide in a dry state is an effective procedure for attaching unsaturated monomers onto polysaccharides. It also would have been obvious to produce polysaccharide having a molecular weight of not more than 700,000 Daltons in view of the recognition in the art, as evidenced by the Jost et al patent, that polysaccharide having an average-weight molecular mass of less than 10,000 allows for the preparation of a product which is biodegradable.

#### ***Response to Arguments***

6. Applicant's arguments filed June 3, 2009 have been fully considered but they are not persuasive. Applicants argue against the rejection of the claims on the ground that the Restaino et al patent does not disclose Applicants claimed method step of depolymerization of the graft copolymer, let alone depolymerization of the graft copolymer to a molecular weight lower than the molecular weight of the ungrafted polysaccharide. This argument is not persuasive since the Restaino et al patent

discloses useful graft copolymers of cellulose degradation products may be obtained by employing high radiation doses (see column 3, lines 11-13). Applicants argue that the instantly claimed process has a drying step which is the opposite of the moistening step in the process described in the Restaino et al patent. This argument is not persuasive since the Restaino et al patent discloses the substrate thereof as having as little as 10% by weight of water during the grafting process. It is noted that the amount of moisture present during the grafting procedure has not been recited in the instantly claimed method.

Applicants also argue that the Jost et al patent does not disclose Applicants' claimed method step (3) of irradiating the mixture with an amount of electron beam radiation sufficient to form an unsaturated monomer-water soluble or water dispersible graft copolymer, wherein the graft copolymer is depolymerized to a molecular weight lower than the molecular weight of the ungrafted polysaccharide. The Jost et al patent is generally cited to show that preparation of grafted polysaccharides having a molecular weight of no more than 700,000 as instantly claimed obtained by a process that involve grafting ethylenically unsaturated monomers onto polysaccharides which may be effected by irradiation is known in the art.

Applicants further argue that the mere mention in the Billmers patent of polymerization in the dry step provides no motivation to one of ordinary skill in the art to replace the polymerization method disclosed in, and essential to, the practice of the Restaino et al invention. This argument is not persuasive since one having ordinary skill in the art would have been motivated to combine the teaching of the Restaino et al patent with the teachings of the Billmers and Jost et al patents since each of the patents disclose preparation of polysaccharide by grafting an unsaturated monomer onto a polysaccharide. Furthermore, the Billmers patent does suggest that irradiation of dry mixture for grafting which may be initiated by irradiative techniques is known in the art (see column 9, lines 59-62).

Accordingly, the rejection of Claims 21-28, 39 and 40 under 35 U.S.C. 103(a) as being unpatentable over the Restaino et al patent in view of the Jost et al patent or Billmers patent is maintained for the reasons of record.

***Summary***

7. All the pending claims (Claims 21-28, 39 and 40) are rejected.

***Examiner's Telephone Number, Fax Number, and Other Information***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Everett White whose telephone number is 571-272-0660. The examiner can normally be reached on 9:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shaojia A. Jiang can be reached on 571-272-0627. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Everett White/  
Examiner, Art Unit 1623

/Traviss C McIntosh III/  
Primary Examiner, Art Unit 1623  
July 17, 2009